ENDOGENOUS MATCHING FUNCTIONS: AN AGENT-BASED COMPUTATIONAL APPROACH

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The matching function has become a popular tool in labor economics. It relates job creation (a flow variable) to two stock variables: vacancies and job searchers. In most studies the matching function is exogenous and assumed to fulfill certain properties. This study looks at the properties of an endogenous matching function. For that purpose we program an agent-based-computational labor market model with endogenous job creation and endogenous job search behavior. Our simulations suggest that the endogenous matching technology is subject to decreasing returns to scale. The Beveridge curve reveals substitutability of job searchers and vacancies for a small range of inputs but is flat for relatively high numbers of job searchers and vertical for relatively high numbers of vacancies. Also it occurs that the matching technology changes with labor market policies. This raises concerns about the validity of labor market policy evaluations conducted with flow models of the labor market employing exogenous matching functions.

1. Introduction

The key idea of the matching function is that it summarizes in a neat way the behavior of firms trying to fill vacancies and of workers looking for jobs, and relates it to job creation. It plays a central role in flow models of the labor market explaining equilibrium unemployment (see [1] or [2]), and has also undergone extensive testing (see [3]).

One aim of the paper is to study the properties of an endogenous matching function and compare them to assumptions usually imposed on exogenous matching functions in the theoretical and empirical labor economics literature. Rather than to assume a holistic function we are interested in whether properties like concavity, job creation being an increasing function of vacancies and job searchers, or constant returns to scale can be generated by a model that cares about the micro-behavior of firms and workers.

The second topic is the endogeneity of the matching function with respect to labor market policies. Policy experiments conducted on the basis of a labor market model with an exogenous matching function may be misleading if the policies change the properties of the matching function. Such a concern is not farfetched as the properties usually imposed on exogenous matching functions are justified on agents' micro-behavior. As policies are targeted to change agents' choices, for example by firm subsidies or mobility vouchers to job searchers, it may very well also affect the properties of the matching technology.

Agent-based computational research is gaining interest among economics' scholars (see for example [4], [5] or [6]) and other social sciences disciplines.[a] The appeal of agent-based computational economics (ACE) is its flexibility of modelling. Heterogeneity of agents and interaction of agents can explicitly be taken care of. After the characteristics of the agents and rules that govern their interaction are programmed, the emerging macro-behavior can be studied.

We employ an agent-based computational setting as it allows for capturing heterogeneity on the side of the firms and workers to a larger extent than analytical models can deal with, without becoming intractable. We depart from the existing literature on endogenous matching functions in a second respect. While agents are usually modelled as optimizers having rational expectations, agents in this study stick to the strategies they are born with. This means that workers always send the same number of applications and firms always post the same number of vacancies over their life-cycle. However, workers and firms have to exit the market if their behavior does not yield positive payoffs. In that case they are replaced by new agents that copy strategies of the surviving workers and firms, respectively. Thus, over time the market will be populated with agents that behave such that they 'survive'.

In labor economics agent-based computational modelling has been attributed great potential (see [8]), especially in studying market outcomes in a world where labor market institutions, such as unemployment benefit or employment protection systems, set by policy makers govern the behavior of agents, and outcomes may lead policy makers to reconsider institutional choices and thereby alter labor demand and supply.

So far institutions are exogenous in our paper. We are primarily interested in the labor market outcomes when firms and workers make their

[a] [7] surveys, for example, agent-based modelling in the political sciences.

individual choices in a stable institutional setting. However, in a second step we simulate changes in labor market policies in order to study their impact on the properties of the matching function.

We believe that endogenous matching functions are an interesting research issue that so far was only dealt with on the basis of analytical models.[b] The following section surveys this literature. Section 3 describes our model. Section 4 reports on the simulation results. The last section concludes and gives some implications of our findings for the suitability of exogenous matching functions as a modelling tool.

2. A review of the literature

The urn ball model[c] has been widely used to study coordination failures as one source of frictional unemployment. Within this framework balls (workers) have to be placed in urns (vacancies) so that a vacancy becomes productive. As workers simultaneously apply for jobs not knowing where the other workers send their applications it may happen that some urns stay empty while others receive multiple applications. As a result some workers may not find a job, even though there are still vacancies on the market. More recent approaches studying endogenous matching function are rooted in the urn ball model but try to develop a richer labor market context. We will briefly sketch the ideas and results of some of those papers and point out to where we can add to the existing analytical work on endogenous matching functions.

Allowing for multiple applications a new coordination failure as compared to the standard urn-ball model will arise (c.f. [12]). In the latter, the coordination failure may lead to a situation where some vacancies do not get applications so that they have to stay unproductive. If workers can send more than one application, very likely every vacancy will get at least one application. But nevertheless a coordination failure may be given. It arises from the competition among firms for single candidates. Once a firm has chosen an applicant to make him an offer other firms may have done so, too. A certain firm may not get its candidate because it was already hired by a competing firm. As a result more applications per worker may not increase the matching efficiency of labor markets. The authors also

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[b] To the best of our knowledge the paper by [9] in this volume is the only other work also looking at matching functions from an ACE perspective.

[c] Those models were analyzed by [10] and [11] among the first. See [3] for a brief summary of the problem of coordination failure.

show that for high but finite numbers of market participants the matching functions exhibits constant returns to scale.

[13] differ from the urn ball model as firms post wages and are heterogenous in their size measured by the number of vacancies they post. In one version of the model the number of vacancies each firm offers differs exogenously, while in the other it is made endogenous. The process of exchange is such that each firm simultaneously posts a wage. Workers know all vacancies and posted wages. They simultaneously choose a vacancy for application. If there is more than one application, firms randomly choose one applicant who gets the job at the posted wage. The authors find a matching function with decreasing returns to scale that converges to constant returns to scale as the number of market participants increases. They also find an outward shift of the Beveridge curve as more firms offer fewer jobs which leads them to claim that empirically observable shifts in the Beveridge could be explained by shifts in the job distribution over firms.

Skill mismatch with jobs having different skill requirements and workers having different skills is allowed for in [14]. With respect to the properties of the matching function they find, with a finite and an infinite number of agents that the matching function is concave and that matches are increasing in both arguments. But only for infinite inputs the matching function has constant returns to scale.

Sticking to homogenous labor supply and demand [15] emphasize the role of wages. An endogenous matching function arises from a labor market in which firms post wages to attract workers. A relatively high wage is not only considered as a cost factor. Firms also take into account that it will lead to more applications and therefore make it more likely that the vacancy gets filled. But on the other hand, workers also anticipate that jobs offering relatively high wages may be crowded with applications making an offer less likely. The trade-offs for the workers and firms drive their wage posting and application strategies. [15] are interested in the effect of the coordination failure on welfare. They find that welfare loss is highest with equal numbers of traders on both sides of the market, no matter how large the market is.

The key difference in [16] from other papers on endogenous matching functions is their auction model for wage determination. Whereas in wage posting models it is assumed that firms offer a binding wage and then are approached by applicants among whom they choose, the process is reversed with auctions. Here, workers announce a reservation wage for which they are willing to work and then are approached by firms. If more than one firm contacts a worker, the worker can bid up his wage. This gives the authors even under the assumption of homogenous firms and workers wage dispersion. As in the other models frictions enter because of coordination problems, capacity constraints, and in a version where vacancy creation is endogenous, externalities associated with new vacancies entering the market. The properties of the endogenous matching function are constant returns to scale and matches that are increasing in vacancies and job searchers.

As has been seen in the discussion of the various urn ball models, it is usually assumed that a single worker does not know what other workers do, or that firms make offers not knowing what their competitors' choices are. These assumptions enter matching models in the form of random behavior of agents. The contribution by [17] is to show that even when the assumption of 'nobody knows what the others do' is dropped, frictions – firms and workers do not come together even though both sides are willing to trade – nevertheless occur. To get the intuition of this result it may be helpful to briefly sketch the model. [17] considers a grid where cabs can locate and passengers stochastically want to move from one location to another but can only do so by taking a cab. It is shown that cabs may optimally locate on the grid such that some passengers do not get served. The properties of the endogenous matching function are constant returns to scale and a right angle shape of the iso-matching curve (or Beveridge curve). Non-substitutability between cabs and passengers is not an empirical characteristic of matching functions but may vanish with the introduction of not-administered prices in the market. The upshot of the argument is that when frictions are the result of optimal choices of agents, policy analysis on the basis of exogenous matching functions may be misleading as agents' new choices may also affect the matching technology of the market.

As [17] we are interested in the endogeneity of the matching function with respect to labor market policies. An issue that so far has rarely attracted attention. Furthermore, our work relates to the existing literature as we also analyze the properties of endogenous matching function. Contrary to the existing studies on endogenous matching functions, we model an agent-based computational labor market. This allows for more structure on both sides of the market. For example, vacancy creation and job search is endogenous in our model. We also depart from other studies by not assuming agents with rational expectations (see also e.g. [18]). Our agents simply stick to their strategies with which they were born. However, those that do not come up with positive payoffs have to leave the market. They are replaced by newly born agents that adopt a strategy of the surviving firms and workers, respectively.

3. The model

There are $m > 0$ workers and $n > 0$ firms. Firms can create vacancies at a cost $costVac$. Those costs can be interpreted as costs for advertising a vacancy but also as some fixed capital cost like e.g. buying a computer that equips the job. The initial number of vacancies $numVac_i$ that each firm i posts is randomly drawn from the interval $[0, numFirms]$ where $numFirms$ is the number of firms in the market.

Workers, indexed by j, are born with different reservation wages r_j reflecting different tastes for leisure. Each worker is initially assigned an application strategy $numAppli_j$ out of the interval $[0, numWorkers]$ with $numWorkers$ being the number of workers in the labor market.[d]

A worker j sends applications, given the behavior of all other workers. Technically workers randomly send applications. Applications are sent to firms that have at least one vacancy. No worker applies twice at the same firm. The assumption of random applications captures the idea of coordination failures on the labor supply side of the market which are the reason for frictional unemployment in the model.

Firms may have received no application or at least one. For the case that no application arrived, the vacancy cannot be filled with a worker and the job does not become productive. If there is more than one applicant for a vacancy at a firm, the firm makes a binding offer to the worker with the lowest reservation wage. Reservation wages are known to the firms as they ask applicants when posting a vacancy what wage they would like to get. Such requests can often be found in newspaper or online adds. The order at which firms are allowed to make a job offer is random, approximating simultaneous and uncoordinated choices of firms. The worker who gets a job offer accepts it and is paid his reservation wage. Hence, all the 'bargaining power' is with the firms. And as a consequence, there is wage dispersion within firms. Workers in the same firm may earn different wages.[e]

[d]In general, having no upper bound for the assignment of strategies would be easiest to justify but would slow down the code. However, given the logic of the market selection mechanism all what is required is that strategies which possibly yield a positive payoff are not ruled out at the initial stage.

[e]There is hardly any work looking for wage dispersion within firms that we would be aware of and that would allow us to judge such an outcome against real labor market features. An exemption is [19] who analyze wages for care assistants finding, as they claim, surprisingly little wage dispersion within firms. Even though there is little within-

The payoff function of the firm i writes:

$$payOff_i = \begin{cases} y * numJobs_i - wageSum_i - costVac * numVac_i \\ \qquad\qquad\qquad\qquad \text{if at least one vacancy is filled,} \\ -costVac * numVac_i \\ \qquad\qquad\qquad\qquad \text{otherwise.} \end{cases} \tag{1}$$

A filled job creates output y from which the firm has to deduct the wage costs and the costs for creating vacancies. If no vacancy was filled the payoff is equal to the vacancy posting costs. We normalize the price at which homogenous goods are sold to one so that all variables are in real terms.

A worker who finds a job receives his individual reservation wage. In both cases, employed or unemployed he has to carry the application costs

$$payOff_j = \begin{cases} wage_j - costAppli * numAppli_j & \text{if employed,} \\ -costAppli * numAppli_j & \text{otherwise.} \end{cases} \tag{2}$$

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The market selection mechanism is such that workers and firms that do not have positive payoffs are eliminated from the market. Those who do not survive are replaced by new agents. The new agents are assigned strategies of the surviving firms and workers, respectively. A new born worker is randomly assigned an application strategy of a surviving worker. The same mechanism applies to a new born firm, respectively. Thus, the new born agents profit from the 'knowledge of the market' that carries on which strategies are helpful for not being kicked out.

After every period all jobs are dissolved. A new application and hiring process starts. Note, however, that all (surviving) agents stick to their strategies over the life-cycle. Figure 1 gives the pseudocode for our model which summarizes the sequence of actions taken by the agents.

4. Simulations

For the simulations we normalize per period labor productivity y to one. Thus, workers' reservation wages are assigned from the interval $[0, 1]$.

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firm wage dispersion in their sample they start speculating on how it might be explained. Their favorite hypothesis starts with a frictional labor market which also lies behind our result.

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Create n firms each posting numVac_i vacancies
Create m workers with reservation wages r_j sending applications numAppli_j
for k periods
      Applying
      for each worker j
            selects all firms i with numVac_i>0
            applies randomly at firms i
      end for each worker
      Hiring
      for each vacancy of n firms
            randomly draw vacancy to be filled
            if workers applied and at least one is still available
                  firm selects worker j with lowest reservation wage r_j
            else
                  vacancy is not filled
      end each vacancy of n firms
      Market selection
      for each firm i
            if payoff of firm i smaller or equal 0
                  firm i exits
                  new firm is born with strategy numVac randomly adopted from
                  surviving firm
      end each firm
      for each worker j
            if payoff of worker j smaller or equal 0
                  worker j exits
                  new worker is born with strategy numAppli randomly adopted
                  from surviving worker
      end each worker
      All jobs are dissolved
end k periods
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Figure 1. Pseudocode

Table 1. Parameters

Parameter	Value
Labor productivity	$y = 1$
Application cost for workers	$appliCost = 0.1$
Costs for posting a vacancy	$vacCost = 0.4$
Number of Workers	$m = 10, 11, .., 50$
Number of Firms	$n = 10, 11, .., 50$

Our baseline simulation refers to the case where the application costs are $costAppli = 0.1$ and the costs for opening up a vacancy $costVac = 0.4$, see table 1. We run simulations for different combinations of firms and workers. Starting with 10 workers and 10 firms the numbers are increased by one up to 50. That makes 1,681 cases. Each case is replicated 10 times so that we arrive at 16,810 runs. Finally, each run consists of 20 periods from which we only report the market outcome of the last period in all runs.

4.1. *Properties of the matching function*

Figure 2 plots one such run for a labor market with 30 workers and firms for 40 periods. The left hand scale refers to the average number of vacancies posted by firms and the average number of applications sent by workers. Both variables start off at relatively high values, driven by the random assignment of strategies from the uniform distribution, but drop quickly to one for the average number of vacancies posted and six for the average number of applications as the firms and workers with negative payoffs are eliminated. The employment rate is around 0.95 and the average wage (wage sum divided by employed workers) is slightly lower than 0.5. It appears that adjustment processes have worked themselves out at period 20 which is the outcome that we report in the subsequent simulations.

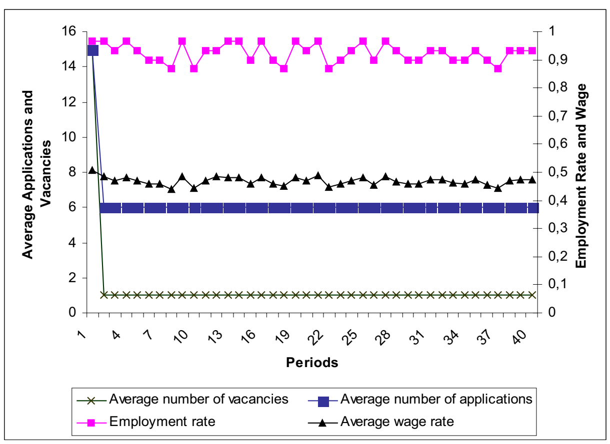

Figure 2. Average applications and vacancies (left hand scale), and employment rate and average wage rate (right hand scale), $numWorkers = 30$, $numFirms = 30$, $costAppli = 0.1$, $costVac = 0.4$

Figure 3 shows job creation in our labor market as the number of vacancies posted increases holding job searchers fixed at 30. It can be seen that as more vacancies are posted by firms more jobs are created. There is an upper bound to job creation. For relatively large numbers of vacancies labor supply restricts job creation. No more than 30 jobs are created as we fixed job searchers to a number of 30. However, the replications of the experiment show that the market not always hits the labor supply constraint even when vacancies exceed labor supply by factor two or more. For the regime where labor supply exceeds labor demand, the latter is the binding constraint for job creation. Job creation cannot be higher than the number of vacancies posted. But also in this regime, market outcomes may not be equal to the labor demand constraint. In fact there is a cloud of points below the labor demand and supply constraints indicating a frictional labor market. Coordination failure by workers when sending applications and by firms when hiring workers generate unemployment.

Job creation is also an increasing function of job searchers holding labor demand fixed (see figure 4). Again labor demand and supply restrictions become important. For relatively high numbers of job searchers the labor demand constraint is binding which was imposed at 30 vacancies. Job creation becomes a flat function of job searchers. For the case where labor supply falls short of labor demand, the supply constraint is binding indicated by the upward sloping part of the graph. There is also a cloud of points below the restrictions because of coordination failures. Even though there are more job searchers than vacancies on the labor market in the flat part of the graph not every position is filled. And in the increasing part of the graph not every replication yields full employment even though there are more vacancies than job searchers.

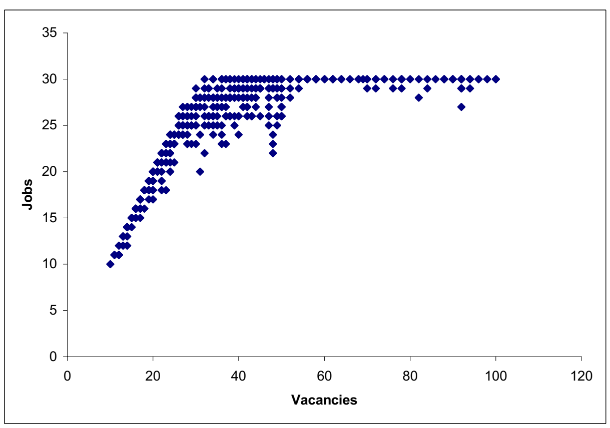

Figure 3. Jobs as a function of vacancies in the market, holding the number of workers fixed at 30.

The Beveridge curve (iso-matching curve) consists of combinations of workers and vacancies in the labor market that yield the same number of jobs. Figure 5 shows the simulation results for 20 jobs. Again we plotted

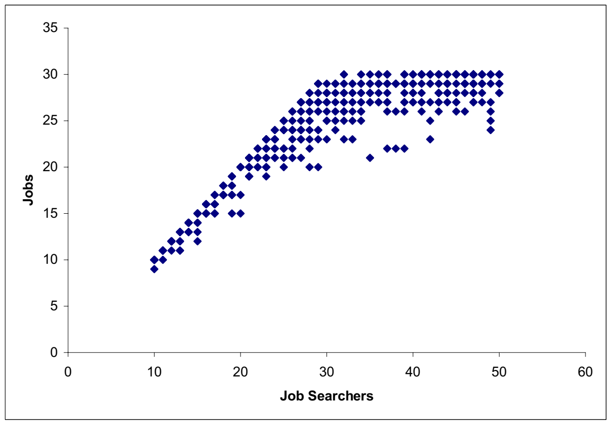

Figure 4. Jobs as a function of workers in the market, holding the number of vacancies fixed at 30

the market outcomes for all 10 runs. Looking at the boundaries of the Beveridge curve in figure 5 shows that it is parallel to the vertical axis for relatively high numbers of vacancies, and parallel to the horizontal axis for relatively higher numbers of job searchers. The reason is that if there are relatively many vacancies on the labor market but only a small number of job searchers, every worker will very likely find a job. Reducing the number of vacancies has not to be compensated by an increase in job searchers to keep matches constant. Considering the other boundary, every vacancy will get filled if it is confronted with relatively many job searchers. Thus, we find a straight line parallel to the horizontal axis at vacancies equal to job creation. Up and right to the boundaries there is a cloud of points. Hence, the market outcome is not always characterized by its constraints on either the labor demand or labor supply side – another way to illustrate the results of the previous figures 3 and 4. Not all vacancies and job searchers get matched. Also one can see substitutability of vacancies and job searchers for job creation. However, the distribution of market outcomes implies not a strong version of substitutability of inputs. In this example, almost anything can happen. Combinations of vacancies and job searchers that yield the same number of jobs are almost equally distributed in the interval where relatively low numbers of searchers and vacancies are combined.

Returns to scale are playing a prominent role in the matching function literature. One reason for that is that a labor market with an increasing

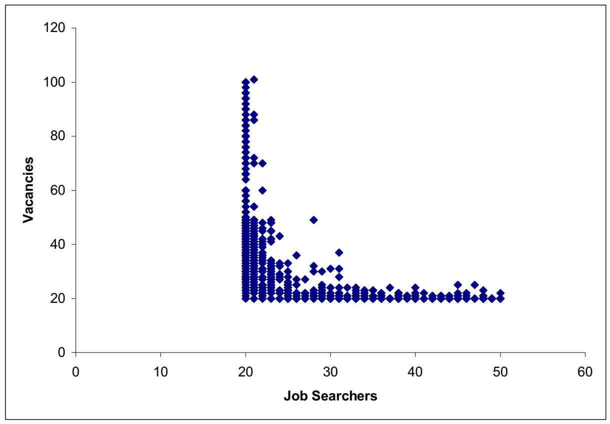

Figure 5. Beveridge Curve, 20 Jobs

returns to scale matching technology may have multiple equilibria.[f] In order to determine the returns to scale of our endogenous matching function we plotted jobs over pairs of equal numbers of vacancies and workers in the market (see figure 6). The regression line with a slope of 0.86 reveals a decreasing returns to scale technology. This is in contrast to the widely accepted result of constant returns to scale or mildly increasing returns from the empirical literature on matching functions.[g]

4.2. *Impact of labor market policies*

Besides the properties of endogenous matching functions we are also interested in the degree of change of those properties if institutions governing the behavior of agents in the labor market are altered. For that purpose

[f] For multiple equilibria in search models see e.g. [20] or [1].

[g] Note, however, that the returns to scale parameter depends on the ray chosen. In figure 6 we plotted jobs over job searchers for job searchers equal to the number of vacancies, implying a ray, defined as the ratio of vacancies over job searchers, equal to one. Inspection of the Beveridge curve shows that at the borders (!) the matching process can possibly be described with a function $Jobs = min(JobSearchers, Vacancies)$. Thus, had we chosen a ray that intersects the Beveridge curve at the borders, we would have gotten constant returns to scale. This is the case as increasing inputs by a factor λ raises jobs by that same factor if the ray is sufficiently small. The same is true for a sufficiently large ray. However, those two extreme cases where the supply and demand constraints rule the job creation process do not apply to the case of a frictional labor market which is what we are mainly interested in.

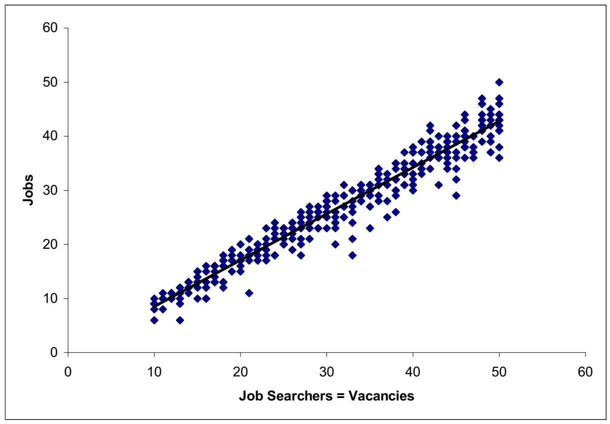

Figure 6. Returns to scale in baseline model

we conducted two policy experiments. One of which can be thought of as a subsidy to firms in order to increase labor demand. Firms are paid a lump sum transfer by a third, external party. The transfer makes it less costly to open up a vacancy. The other policy is a transfer to the workers lowering their search costs. For example, this could be a mobility voucher which gives workers an incentive to send applications also to firms that are not in commuting distance. To simulate the impact of the subsidy to the firm we lowered the cost of opening up a vacancy to 0.2 and 0.3, respectively (as compared to 0.4 in the baseline model), leaving everything else constant (see table 2). Returns to scale hardly change with the vacancy costs. However, with respect to the application costs which we decreased from 0.1 to 0.05 in steps of 0.01 we observe a considerable change in the returns to scale parameter. It increases from 0.86 to 0.92 if the voucher lowers the costs for applying from 0.1 to 0.05 at vacancy costs of 0.4. The result is replicated at lower levels of vacancy costs with changes from 0.88 to 0.93 and 0.94, respectively. Clearly this lends support to the idea that one has to be aware that policies may also change the matching technology of labor markets. What stands behind those results is a change in applications sent out by workers. Reducing application costs by one half almost doubles the average number of applications (keeping *costVac* at 0.2). Changing the costs for opening a vacancy while leaving the application costs constant has hardly an impact on the behavior of the firms measured by the average number of vacancies posted.

Table 2. Returns to scale parameters

	appliCost					
	0.05	0.06	0.07	0.08	0.09	0.1
vacCost						
0.2	0.94	0.93	0.92	0.90	0.89	0.88
0.3	0.93	0.91	0.92	0.89	0.88	0.88
0.4	0.92	0.89	0.89	0.87	0.87	0.86

Table 3. Employment rates

	appliCost					
	0.05	0.06	0.07	0.08	0.09	0.1
vacCost						
0.2	0.96	0.93	0.92	0.90	0.89	0.89
0.3	0.95	0.92	0.91	0.90	0.88	0.85
0.4	0.97	0.92	0.90	0.89	0.87	0.86

We believe that a more systematic investigation is needed. Nevertheless we want to point towards the possibility that assuming exogenous matching technologies may generate misleading results in policy experiments conducted within flow models of the labor market.

How the policy measures translate into employment rates is shown in table 3. For calculating the employment rates we took all those market outcomes that already entered the calculation of the returns to scale parameter. That is, increasing the level of inputs, job searchers and vacancies, but keeping their ratio constant at one. Plotting the employment rates over job searchers revealed a regression line with an almost zero coefficient on the job searchers variable. In other words, the employment rate seems to be independent from the scale of inputs. What is reported in table 3 is the intercept of the regression. While lowering application costs pushes up employment, lower vacancy costs do not have an impact on employment.

Can anything else be derived from those two results, decreasing returns to scale and independence of the employment rate from the scale of inputs with respect to the matching technology? Yes, both facts together imply, that the matching technology cannot be Cobb-Douglas, the most preferred assumption in empirical estimates of the matching parameters and also in flow models of the labor market.[h]

[h]To see this, assume a Cobb-Douglas matching technology $E = AS^{\alpha}V^{\beta}$, where A, α and β are parameters satisfying $A > 0$ and $\alpha, \beta > 0$, and S shall be job searchers

5. Conclusions

We programmed an agent-based computational labor market model with the following features: endogenous vacancy creation, endogenous job search, random applications, firms that pay workers their reservation wages, and a market selection process that eliminates agents that do not have positive payoffs. One purpose of the exercise was to study the properties of the endogenous matching technology and compare them to generally assumed characteristics of exogenous matching functions. We found that job creation is increasing in its arguments: vacancies and job searchers. Contrary to most of the empirical literature our endogenous matching technology has decreasing returns to scale. The simulated Beveridge curve is flat and vertical at the boundaries, respectively. There is substitutability of inputs.

Secondly, we were interested in the endogeneity of the matching function with respect to labor market policies. It occurs that the matching technology is affected by policies which would make an exogenous matching function an inappropriate tool for policy evaluations. Simulating the effects of a transfer to job searchers revealed that the matching technology changed – shown by an increase in the estimated returns to scale parameter. While no such effect is observable when subsidies are paid to the firms in our model, it nevertheless raises an important point with respect to policy evaluations. The results from labor market policy evaluations based on models with exogenous matching functions could be biased if modelers do not take into account that the matching technology itself may also change with the policy. If one takes the interpretation which usually comes with the use of a holistic matching technology seriously, namely that it captures in a neat way the micro-behavior of agents, this is a serious claim.

Empirical work on the matching function usually starts with the assumption of a Cobb-Douglas technology which can easily be log-linearized for estimating the returns to scale coefficient. It is also popular to assume such a technology in flow models of the labor market. Our model does not lend support to a Cobb-Douglas technology. This raises concerns about the

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or workers, and V the number of vacancies. Then, the employment rate becomes $E/S = A/(S^{1-(\alpha+\beta)})$. As by assumption all jobs are dissolved after every period and every worker is looking for a job, the labor force is equal to job searchers. Also remember that the simulation that led to the independence of the employment rate from the scale of inputs was conducted imposing $S = V$. Clearly, an employment rate that is independent from the number of workers can only be achieved in the framework of a Cobb-Douglas function, if returns to scale were constant. This, however, is not the case in our computational model as table 3 shows.

validity of empirical estimates of the parameters of the matching function. Also it questions the macroeconomic effects of labor market policies found in flow models of the labor market. Whether our results are robust against different specifications of agent-based computational labor markets remains to be seen.

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Appendix A.

The model is programmed in RePast. The code is available from the author (*michael.neugart@wirtschaft.tu-chemnitz.de*).

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